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INSTRUCTIONS FOR THE SAMPLING, HANDLING, ANALYZING, AND GRADING OF SAMPLES OF MILLED RICE.

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INTRODUCTION.

The following instructions for the sampling, handling, analyzing and grading of samples of milled rice, including a list of the apparatus necessary, and a table of equivalents for the metric weights used, are prepared for the information of those who will grade milled rice under the standards published by the United States Department of Agriculture in Bureau of Markets Document No. 15.

In the practical application of these standards, it is fully appreciated that, even with the definite limits provided for all the most important grading factors except for color and general appearance, questions will arise on which the best of experts will differ. It is believed, however, that by strict adherence to the instructions which are given herein, these differences in grading will be reduced to a minimum and the standards will be understood and applied uniformly throughout the United States. It is not believed that it will be necessary to make detailed analyses in the grading of every lot of milled rice. In a large number of cases, competent and experienced milled rice graders, after having once become familiar with

the various limits fixed and the color types, can estimate the quality and condition of the rice sufficiently well to determine the proper class and grade without making a detailed mechanical analysis of the sample.

SAMPLING.

In the grading of milled rice no operation is of more importance than that of securing a sample which is thoroughly representative of the lot. It is recommended that the sample be drawn from such a number of bags (pockets) selected at random from the entire lot, as will, in the judgment of the sampler, show an average of the lot. Ordinarily the probing of every tenth bag (pocket) should secure a commercially representative sample. The size of the sample in all cases should be at least one dry quart (approximately 950 grams). The sample should be placed in an air-tight container in order to insure accuracy if a moisture test is to be made, and to prevent the rice kernels from becoming "checked" from a sudden change in temperature or from becoming wet in inclement weather.

It is impractical to make a mechanical separation on the entire quart sample, and it becomes necessary, therefore, to divide the sample in practical grading in order to obtain a smaller portion for the determination of class and grade factors. It is essential that care be taken to see that the portion to be analyzed is representative of the original sample. Large samples may be accurately divided into representative portions by the use of the Boerner sampler, described in U. S. Department of Agriculture Bulletin No. 287, or by any other device and method which gives equivalent results.

METHOD OF HANDLING SAMPLES.

ORDER OF DETERMINATION.

(1) The determination whether or not the sample is "milled rice" according to the standards.

(2) The determination of class.

(3) The determination of grade:

  (A) Compare the sample with color and texture types for the different grades of the class to which it belongs.

  (B) If the sample is not placed in "Sample Grade," because of color, foreign material, weevils, etc., and if in Class I, II, III, or VI, make determination for:

    (a) The number of seeds in 500 grams,

    (b) The number of paddy grains in 500 grams,

    (c) The number of heat damaged kernels in 500 grams,

    (d) The percentage of whole kernels present,

    (e) The percentage of broken kernels which will pass readily through a No. 6 sieve,

(f) The percentage of damaged kernels present, and

(g) The percentage of chalky kernels present.

(C) If the sample is not placed in "Sample Grade," because of color, foreign material, weevils, etc., and if in Class IV or V, make determinations for:

(a) The number of seeds in 500 grams,

(b) The number of paddy grains in 500 grams,

(c) The number of heat damaged kernels in 500 grams (in class IV only),

(d) The percentage of damaged kernels present (in class IV only), and

(e) The percentage of chalky kernels present.

(D) If the grader is satisfied that the rice does not contain more than 14½ per cent of moisture, or if in respect to some factor other than moisture it falls in "Sample Grade," a moisture determination need not be made.

It should be borne in mind that any one factor alone may determine the grade. For example, a sample may be good enough in quality to grade No. 1 in all respects except that it contains a large number of seeds; in such a case it might be necessary to determine only the "seeds in 500 grams," and no time need be wasted in making detailed determinations for the other grade factors. Also, if a preliminary examination shows the presence of weevils, sour odor, or other conditions which would be reason for placing the rice in "Sample Grade," no further analyses are necessary.

WHETHER OR NOT MILLED RICE.

Separate the paddy grains, seeds, and other foreign material from a 500-gram portion of the sample and weigh the separation. If the weight of this separation exceeds 20 per cent of the weight of the portion analyzed, the lot is not milled rice according to the standards.

On a 100-gram portion of the sample from which the paddy grains, seeds, and foreign material have been removed, make a determination for broken rice which will pass readily through a No. 5½ sieve. If the weight of the finely broken rice exceeds 5 per cent of the weight of the portion analyzed, the lot is not milled rice according to the standards.

DETERMINATION OF CLASS.

Analyze a 100-gram portion of the sample which is free from paddy grains, seeds, and foreign material. Separate and weigh the whole kernels.

If it is found that more than 25 per cent of the sample is composed of whole kernels, make the separation for class by using only

the whole-kernel separation. Milled red rice is not considered as "other rice" merely because of its color. It should be classified as long-grained, medium-grained, or short-grained, according to the relative length of its kernels. Ordinarily it will fall in the predominating class of the rice in which it is found. If more than one-half of 1 per cent of the whole kernels is found to be rice of a kind other than the predominating class, the sample is considered to be "Mixed" rice. If one-half of 1 per cent or less of whole kernels of rice other than the predominating class is found, the sample is not considered to be "Mixed" rice.

If it is found that 25 per cent or less of the sample is composed of whole kernels, the class is either "Screenings" or "Honduras Second Head." If the kernels are of the medium-grained or short-grained types of rice, no sieving is necessary, and the sample belongs to the "Screenings" class. In case the kernels are of the long-grained type of rice, the sample should be separated into different sizes by means of a No. 6½ and a No. 6 sieve. If more than 10 per cent of the sample is found to pass readily through a No. 6½ sieve, or if more than 40 per cent is found to pass readily through a No. 6 sieve, the sample belongs to the "Screenings" class. If neither of these conditions is found, the sample belongs to the "Honduras Second Head" class. The definitions of the classes "Screenings" and "Honduras Second Head" should be interpreted in the light of the foregoing explanation.

DETERMINATION OF GRADE FACTORS.

Color, texture, and general appearance.—Use for the determination a portion of the sample which is free from paddy grains, seeds, and other foreign material. Place the sample being graded alongside the type samples of the class to which the rice belongs, beginning at grade No. 1 and continuing through the lower grades in order until a comparable type is located. If it is found that the sample is not comparable to any of the types of the class, it should be graded "Sample Grade." The sample should be approximately the same size as that of the type with which it is being compared, and it should be exposed to the same light conditions when the comparison is being made.

Foreign material.—Use for the determination a 500-gram portion of the original sample. Separate the foreign material by hand or with the aid of sieves. Weigh the separation, excepting the seeds and paddy grains, and record the weight in terms of percentage.

Seeds.—Use for the determination a 500-gram portion of the original sample. Separate the seeds by hand, or with the aid of sieves, count them, and record the number found in 500 grams.

Paddy grains.—Use for the determination a 500-gram portion of the original sample. Separate the paddy grains by hand, or with the aid of sieves, count them, and record the number found in 500 grams.

Heat damaged kernels.—Use for the determination a 500-gram portion of the sample which is free from paddy grains, seeds, and foreign material. Separate by hand the heat damaged kernels (stack-burnt, or those kernels which have been distinctly discolored by heat). Count the kernels and record the number found in 500 grams. When broken heat damaged kernels are found, they should be counted and recorded as the number of entire kernels to which they are equivalent.

Whole kernels.—Use for the determination a 100-gram portion of the sample which is free from paddy grains, seeds, and other foreign material. Separate the whole kernels by hand, or with the aid of sieves, weigh the separation, and record the weight in terms of percentage.

Broken kernels through sieves.—Use for the determination a 100-gram portion of the sample which is free from paddy grains, seeds, and other foreign material. Place the sample on the topmost of a nest of sieves composed of a No. 6½, a No. 6, and a No. 5½ which is provided with a suitable bottom pan. Shake the nest of sieves until those broken particles of rice which will pass readily through the different sieves have been separated. Weigh the separations separately and record each weight in terms of percentage.

Damaged kernels.—Use for the determination a 100-gram portion of the sample which is free from paddy grains, seeds, and other foreign material. Separate the damaged kernels by hand, weigh the separation, and record the weight in terms of percentage.

Chalky kernels.—Use for the determination a 100-gram portion of the sample which is free from paddy grains, seeds, and other foreign material. Separate the chalky kernels by hand, weigh the separation, and record the weight in terms of percentage.

Moisture.—Use for each moisture determination a 100-gram portion of the original sample which should be taken directly from the air-tight container. Follow the method described for corn in Circular No. 72, issued by the Bureau of Plant Industry, U. S. Department of Agricuture, except that the double-walled flask described in U. S. Department of Agriculture Bulletin No. 56 should be used. Any method for the determination of moisture which gives results equivalent to those secured by the method specified above is satisfactory.

METRIC WEIGHT EQUIVALENTS.

500 grams are equivalent to 1 lb. 1 3/5 oz. (avoirdupois).

100 grams are equivalent to 3½ oz. (avoirdupois).

1 oz. (avoirdupois) is equivalent to 28.35 grams.

1 lb. (avoirdupois) is equivalent to 453.6 grams.

1 quart (dry measure) is equivalent to approximately 950 grams of milled rice.

APPARATUS FOR GRADING MILLED RICE.

All or only a part of the following apparatus will be necessary, depending upon the condition of the rice to be graded:

(1) A milled rice trier (probe), at least 8 inches long.

(2) Air-tight containers (sample cans), capacity 1 dry quart.

(3) A balance which is sensitive to 50 milligrams, and which has a weighing capacity of 500 grams, with a set of weights, 1 gram to 500 grams.

(4) One or more pairs of forceps or pincers for use in hand picking a sample for damaged kernels, seeds, etc.

(5) Four hand sieves and bottom pan made preferably of aluminum for use in separating whole kernels, broken kernels, seeds, paddy grains and other foreign material. Each of these sieves and the pan should be circular in shape, 12 inches in diameter, 1½ inches deep, and for the most efficient work they should be made to nest so that all sieving can be done in one operation. The sieves necessary or suggested are as follows:

(a) No. 5½.—Metal sieve perforated with round holes 5½/64 of an an inch in diameter.

(b) No. 6.—Metal sieve perforated with round holes 6/64 of an inch in diameter.

(c) No. 6½.—Metal sieve perforated with round holes 6½/64 of an inch in diameter.

(d) No. 8.—Metal sieve perforated with round holes 8/64 of an inch in diameter. (For use in making whole-kernel separation).

(6) A device for correctly dividing a rice sample into smaller portions for the different analyses. (Boerner Sampler).

(7) A Brown-Duvel moisture tester of at least two compartments, completely equipped with: Flasks, certified centigrade thermometers to read correctly to 190 degrees, graduates of 25 c. c. capacity, rubber stoppers, heating and measuring appliances, a weighing device and a supply of oil, etc. (See United States Department of Agriculture, Bureau of Plant Industry, Circular 72.)